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ABSTRACT

The Clearinghouse on Educational Management produces information analysis products because the educational data base is so extensive and its quality varies considerably from document to document. Some of the Clearinghouse's products summarize and condense into manageable quantities the aggregate knowledge that exists. A second group of products makes judgments about what is of value and what is not. A third group interprets for school practitioners the implications of research findings for the operation of the schools. The products that compact the literature are primarily variations on the bibliographic format. The evaluative products are primarily state-of-the-art papers produced by experts commissioned by the Clearinghouse. The interpretive products usually both analyze and synthesize the literature. A good example of this group is the School Leadership Digest, a series of monthly reports that provide interpretive summaries of the research knowledge. (Author/IRT)

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Information Analysis at the ERIC Clearinghouse on Educational Management: Rationale and Classification of Products

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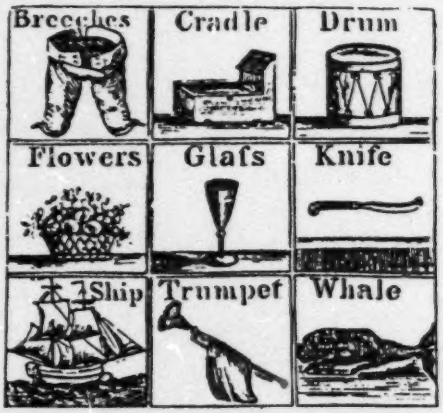

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An information system must perform a range of functions if it is to meet the diversified needs of its clientele. For a modern information system the scope of ERIC (Educational Resources Information Center), these functions include acquiring, indexing, and abstracting research projects and journal articles, supplying computer and manual searches of the data base, responding to user queries, and publishing reviews and other information analysis products.

To focus on just one of these functions can give a distorted image of the information system as a whole. It is important to establish in the beginning, therefore, that an effective information analysis program depends on all the other functions because most of the information to be analyzed comes from the system itself. If a review article, for example, is to cover all relevant literature on its topic, the raw material must have been acquired and processed into the data base and it must have been accurately indexed in order to be retrievable. Even the user services program is essential because trends in user requests point to topics on which reviews and other products are needed.

Because information analysis depends on the other functions, it usually follows them in order of establishment. The primary goal in the early stages of development of an information system is that of expediting the *exchange* of information. Knowledge that will answer most users' needs is assumed to exist somewhere. The objective is to acquire it, get it in the system, and retrieve it in response to requests. It makes sense, at this stage, to direct resources principally toward building a document base and perfecting a system of retrieval.

Later, as the data base attains an appreciable size, the system is ready for a moderate shift in its priorities. Besides continuing to expedite the exchange of information, the system is now able to mount an effort to *analyze* and *repackage* that information into forms more readily usable by its clientele. Three factors contribute to this shift in emphasis. First, a reservoir of literature that can be reviewed and analyzed has been accumulated. Second, some of the creative energy and resources that were necessary to design and implement the document acquisitions, indexing/abstracting, and computer retrieval systems, which are now operational, can be diverted to other ends. And users, who once were satisfied with access to all the information they could get, are now so overwhelmed with the stacks of printouts retrieved by the computers that they are expressing their desire for more summaries and digests.

This pattern is well exemplified by the ERIC system. Launched by the U.S. Office of Education in 1966 (the program was moved to the National Institute of Education in 1972), the first 12 clearinghouses were established in June of that year and immediately set to work acquiring documents in their respective subject areas. Although Central ERIC, the coordinating agency in the Office of Education, supplied the clearinghouses with indexing and abstracting guidelines, each clearinghouse was left with the task of devising its own document processing procedures and training its personnel to follow them. This work preoccupied the clearinghouses for most of a year.

Not until late 1967 did the first information analysis products--mostly bibliographies--emanate from the clearinghouse. Through June 1968, the clearinghouses had published only 149 products. By contrast, two years later during the 1970 fiscal year they issued 366 products, including a much higher percentage of reviews and state-of-the-art papers.

The Clearinghouse on Educational Administration (in 1970 renamed the Clearinghouse on Educational Management) was established in July 1966 at the University of Oregon. By December 1968, the clearinghouse had completed 10 bibliographies, two number and subject indexes, and two reviews. Its first major products--five state-of-the-knowledge papers written by commissioned scholars--were begun in 1969 and published in 1970 in a monograph, *Social and Technological Change: Implications for Education*. Since 1970, the clearinghouse has added 29 monographs to the state-of-the-knowledge series and has published scores of other products in 12 additional series or sub-categories of series. At the time of this writing--September 1976--its published products total 234.

As a background to describing these products, it is fitting first to explain the rationale for information analysis, since the logic for the different kinds of products will be seen to derive from the needs they are intended to meet. The rationale for information analysis stems from two characteristics of the information itself--its voluminous quantity and its variable quality.

The Problem of Quantity

Users of an information system are not likely to be much interested in information analysis when the amount of materials in the system is relatively slight, say 10,000 items, which is about what ERIC contained in December 1968 (exclusive of special collections). Published indexes afford a relatively easy means of scanning entries, and a manual or even a computer search of all materials on a topic is not likely to be terribly unwieldy. But increase the number of items in the data base by a multiple of 24--as has happened with ERIC since 1968--and the limitations of traditional methods of scanning and retrieving information become readily apparent.

Physical scientists encountered the problem of quantity in information retrieval long before their colleagues in education did. Samuel Goudsmit observed in a 1966 issue of *Physics Today* that "a modern computer can make a complete literature search in a remarkably short time and overwhelm the research worker with a bibliography that requires a lifetime to read and study." Two years later in the same journal, Conyers Herring warned that the information crisis "threatens to slow the progress of science significantly" unless it is averted by "creative synthesis and compaction of facts and ideas."

Also in 1968, Lewis Branscomb, an astrophysicist writing in *Scientific Research*, considered it "fair to say that the need for far more extensive reviews to reduce the raw materials of the information system to a more concentrated form is now universally accepted . . . . It is just absurd for the user to tap the total collection of raw material for his data as it would be for the jeweller to order six tons of gold-bearing ore when he wants to make a cuff link."

Certainly not all users have identical information needs or approach documentation from the same perspective. Researchers may actually prefer sifting through primary sources, at least to some degree, whereas a school teacher or principal, if for no other reason than lack of time, is more likely to shun such a task. Our experience with the clearinghouse's clientele--primarily elementary and secondary school administrators, professors of educational administration, doctoral students, and facilities planners--suggests that practitioners are among the first users to be frustrated by an exclusive emphasis on retrieval. But if the experience of the hard sciences affords any clue to what may soon or even now be happening in education, the research process itself may be suffocated by an oversupply of

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data--much of it unneeded--readily accessible through the computer.

The Problem of Quality

Just as the computer is no answer to the problem of quantity (some would say it has even compounded the problem), it is similarly unable, as Goudsmit (1966) pointed out, to "judge the quality of retrieved material." Branscomb (1968) claimed that the real problem facing users of computer retrieval systems is that of not knowing what to believe. He asserts that "much of the data in the literature is wrong" and that too many scientific papers present information "in such a way that no one can tell whether it is right or wrong." Such information is not useful, and for this reason he concludes that "we need better quality control in science."

Certainly every discipline, and not least of all education, could confess its need for better quality control. Ward and others' (1974) evaluation of published educational research is a stinging indictment of the continued "mediocre" quality of educational research articles published in educational journals and journals of related professions. The study used 171 judges randomly selected from members of the American Educational Research Association, Division D (Measurement and Research Methodology), and further selected on the bases of "earned doctor's degree," "number of publications," and "supervision of theses and dissertations." The judges rated only 8 percent of the research articles in all journals "acceptable as is for publication." By contrast, 27 percent were rated "reject," and 34 percent were rated "acceptable only after major revisions."

Sociologist Amitai Etzioni (1971) believes that the solution to this problem of the uneven quality of research literature is not to attempt "to raise the standards of the tens of thousands of scientific and scholarly publications," which, in his opinion, "seems a hopeless task." Instead, he proposes the introduction of quality control "filters" at those systems where the literature is circulated and retrieved. By coding or ranking literature in the systems, users could choose materials "that meet only some specified criteria," for example, "whether they present limited or extensive data." These filters "are needed to save precious working years for the scientific community, which now faces the options of being flooded by unneeded information, devising its own ad hoc filters as the system spouts out its publications (or lists of references), arbitrary skimming of the endless pulp, or ignoring it altogether."

Although Etzioni's proposal has much merit, no method of coding is a complete solution to the variable quality of research literature. ERIC, unlike some information systems, purposely has built quality control filters into its selection process. Each clearinghouse adheres to guidelines specified by the *ERIC Processing Manual* in selecting materials in its subject area for entry to the system. As a result of this filtering process, the Clearinghouse on Educational Management, for example, approves for processing only about half of all the materials it regularly acquires, whether solicited or unsolicited.

In spite of these efforts it would be foolish not to acknowledge that ERIC's data base contains some material of inferior quality. The selection procedures do guarantee that the data base is of higher quality than the sum total of everything written in the field of education, but, as Ward and others' study suggests, that may not be saying much. Even if additional filters of the type Etzioni proposes were added to the system, the user would still be forced to sort out the good from the bad; obviously not all papers that present extensive data or meet any other such objective tests are inherently of high quality. And although these filters may be a satisfactory solution for some researchers, since they would at least reduce the quantity of material retrieved for study, most practitioners lack the time and the expertise to read and discern the value of even the most selective batches of research.

The need for two principal kinds of information analysis products is therefore readily apparent. Some products are needed to summarize and condense into manageable quantities the aggregate knowledge that exists. Others are needed to make judgments about what is of value and what is not. Most publications of the Clearinghouse on Educational Management fall into one or both of these categories. There are additional products, however, that do not so much condense or evaluate knowledge as demonstrate how it is to be applied. And so we add a third category of information analysis products that interpret for school practitioners the implications of research findings for the operation of schools. Thus one set of products has as its purpose *compaction* of the literature; another, *evaluation;* and a third, *interpretation.*

Compaction

Nearly every publication issued by the clearinghouse in some degree or other serves to summarize a particular section of literature. The author of an evaluative monograph, for example, will usually also summarize the research studies to be evaluated and may survey related literature as well. Restricting attention only to those products whose primary purpose is to condense information still leaves six series having a total of 137 titles--more than half the clearinghouse's information analysis output.

Four of these series are variations on the bibliographic format. They include the Bibliography series with 20 titles, the AASA/ERIC Abstracts Series with 37 titles, the Best of ERIC with 20 titles, and the Educational Facilities Digest with 10 titles. Except for 10 titles in the Bibliography series, all the publications are annotated bibliographies, which vary greatly in style and content.

On one end of the scale are the AASA/ERIC Abstracts, collections of research report resumes selected from *Resources in Education,* the monthly ERIC index and abstract catalog. The resumes, consisting of bibliographic and ordering information and the abstracts, are only minimally edited and so retain the heavy catalog writing style. Nevertheless, the series has been extremely popular with practitioners, who find the publications a convenient surrogate for a manual or computer search, with the extra advantage that only those materials directly relevant to the topic are listed. The series' success is largely a tribute to effective design and promotion by the American Association of School Administrators, which, through a cooperative publishing arrangement with the clearinghouse, prints and markets the publications.

The Best of ERIC series, on the other hand, features freshly written summaries of the original materials. Each four-page issue summarizes 10 to 15 carefully selected reports and journal articles (as opposed to 40 to 60 items reviewed in the much lengthier AASA/ERIC Abstracts). The annotations in the Best of ERIC are long enough to portray the substance of each document and are written in a clear, lucid style for maximum readability. All the annotations read together are intended to give a well-rounded perspective on what is known about the topic. Through distribution arrangements with three professional organizations--AASA, the Association of California School Administrators, and the Wisconsin Secondary School Administrators Association--The Best of ERIC reaches 32,900 school practitioners.

The Council of Educational Facilities Planners prints and distributes to its members still another series of annotated bibliographies, the Educational Facilities Digest. Each four-to-eight-page issue begins with a brief review of issues and trends in the topic and a general survey of the literature. This introduction is followed by an annotated bibliography reviewing each document separately. The annotations vary in length, depending on the content of each document, and, like the Best of ERIC, are lucidly written.

From 1971 to 1973 the clearinghouse published 50 review papers in two related series, one on a range of topics in educational management and another in educational facilities. The two series had identical formats. Usually eight-to-ten pages in length, the papers would devote one or two pages to an overview of the topic, then briefly review each of 20 to 30 reports and journal articles grouped together by subtopics. These reviews were "descriptive" in nature in that they described objectively and without critical comment the knowledge that existed on particular topics.

All these products are intended to save the user time by condensing available information. Evaluation is exercised, for the most part, only implicitly in selection of the materials to be reviewed. Whether the information is valid or not and how it is to be used are left for the user to determine.

Evaluation

Obviously, it is much easier to summarize the findings and conclusions of a body of literature than it is to assess their significance. But because so many variables can affect the reliability of research findings, evaluation is an arduous but necessary addition to the information analysis process.

The purpose of evaluation is to explain contradictions and to increase confidence in the research findings. But evaluation must examine not only the findings; it must appraise the research process. To determine the reliability of a study's findings, the information analyst must evaluate the methodology the researcher employed. This is the task Raoul Naroll (1962) has termed "data quality control." It requires a systematic

assessment of the research approaches and settings, including such factors as the size and representativeness of the samples and the effectiveness of the controls used.

After such a systematic evaluation has been completed, the analyst can weigh the relative validity of the findings. Relevant corroborating and contradicting evidence can be sifted so that only the most reliable findings remain. Trends and conclusions that had been arrived at earlier by taking all the research findings at their face value can now be reexamined in the light of only the most reliable evidence.

In its most systematic form, evaluation is a time-consuming and demanding process that requires the skills of a researcher knowledgeable in statistical analysis and other research techniques. Obviously, the evaluator must also possess a keen awareness of the subject area.

Evaluations of research literature vary widely in their thoroughness and rigor. Relatively few evaluations exist that have systematically evaluated all or even the majority of the research literature on a particular topic, and many of the evaluations that do exist are either highly selective in that they include only a few studies or largely subjective in that they result not so much from systematic evaluation of research approaches and techniques as from the writer's own judgment of what is valid and what is not.

Evaluation is one element the clearinghouse has required of the scholars it has commissioned to write state-of-the-knowledge papers. These monographs, usually 60 to 80 pages long, are the most extensive products of the clearinghouse. To date, 34 have been published. The scope and organization of these papers vary greatly, depending on the topic, but four elements predominate. Most of the papers contain a brief introduction that defines the topic, an analysis of relevant literature, a synthesis that organizes and integrates the separate strands of knowledge bearing on the topic, and a projection of the future development of knowledge in the topic. The analysis section includes an evaluation of the literature, which, though it need not be lengthy, does underlie the author's discussion of what is known. The authors are also encouraged to go beyond their analyses of current knowledge and to propose their views of "what should be."

Because the authors are experts in their subject area, they are able to make exacting judgments about the strengths and weaknesses of pertinent research. Two good examples of such evaluations are *The Politics of Education,* by Laurence Iannaccone and Peter J. Cistone, number 20 in the series, and *Voting in School Financial Elections: Some Partial Theories,* by Philip K. Piele and John Stuart Hall, number 28. Unfortunately, these publications are only a drop in a bucket compared with the need that exists in education for systematic, rigorous evaluations of research literature. Such evaluations require an enormous amount of time, talent, and creativity, all of which are in short supply. The clearinghouse's funding--and that of ERIC generally--is simply not sufficient to generate all the evaluations that are needed.

Interpretation

The men and women who teach in and administer the nation's schools are decidedly pragmatic in choosing information sources. They do not have the time to plod through lengthy summaries of the research literature, nor are they helped just by knowing which studies carry more weight. What they do want to know are new principles, techniques, and insights that are immediately applicable in the field. This is not to suggest practitioners refuse to read anything of a purely conceptual nature, but they assign highest priority to materials through which they can gain an understanding of what the research means for them in practical terms.

Interpretive information analysis products are particularly useful for practitioners because they explain the significance of research findings. Interpretive reviews point out trends in the literature; they show, for example, where the authors are in agreement and where they are in disagreement. On topics with a large body of research literature that contains conflicting findings, interpretive reviews help the reader to understand quickly what evidence exists for the different conclusions. From the analysis the practitioner can decide which course of action is warranted by the weight of the evidence.

Products in this category usually perform both the functions of analysis and synthesis. The reviewer must first break up the whole of the literature into its particular findings and conclusions before he can then go on to the task of organizing and integrating the bits and pieces of knowledge into general propositions. The latter process of synthesis is particularly necessary if the reader is to come away from the product with an

accurate overall perspective on the knowledge concerning the topic.

The School Leadership Digest, a series of monthly reports prepared by the clearinghouse for distribution by the National Association of Elementary School Principals, is a good example of interpretive summaries of research knowledge. The reports are written for practitioners who are assumed to have minimal familiarity with the topics. The reviewers carefully analyze 30 to 50 documents before writing a 20-page digest of the knowledge on the topic. Each digest clearly states the trends, similarities, and differences in the research evidences and conclusions. The reports' lucid style greatly facilitates communication of the information.

The clearinghouse's most recent contacts with school administrators have underscored the need for concise interpretive products having a distinctly practical emphasis. A new series being planned in cooperation with AASA is an attempt to meet this need. Each issue, no more than four to six pages long, will review and analyze one empirical study with the purpose of explaining the practical significance of its findings to school superintendents. Four issues are to be published during the next year.

In recent years, the clearinghouse has devoted much of its resources to developing and improving its interpretive information analysis products. Here again the demand is far greater than the clearinghouse can supply. The problem is complicated by the fact that these products, to be most helpful, must be targeted for a specific audience; principals and superintendents, for example, do not share the same tasks and responsibilities and thus do not share the same information needs. The clearinghouse faces a major challenge in allocating its limited resources to meet the needs, at least in some degree, of all its clients.

Conclusion

From the foregoing, it is apparent that the clearinghouse prepares most of its information analysis products for use by school practitioners. It would be wrong to conclude from this practical focus that information analysis has no value for the process of research per se or that the clearinghouse fails to perceive its value. All who are part of the clearinghouse's information analysis program share the conviction that the process of compacting, evaluating, and interpreting knowledge is indispensable to the orderly progress of research.

Piele and Hall (1973) have pointed out that "it is not only the school official who is confused by or unaware of the meaning of various research findings. Because of the increase in the number of studies--particularly of the unpublished variety--it is becoming increasingly difficult for those conducting basic research to be aware of all relevant findings, much less their interrelationship and theoretical importance." The axiom that new research proceeds from old research is here most meaningful, for if the researcher is to make efficient use of previous research findings he or she must know they exist and understand their significance.

Information analysis makes a two-fold contribution to the research process. Reviews that summarize, categorize, and evaluate existing findings uncover discrepancies and anomalies that can be investigated by future researchers. A further benefit results from the labor of highly skilled analysts who in the process of examining the data discover new correlations and in this respect create new knowledge. "Science," Herring has pointed out, "consists in the creation of simplicity out of the complexity of nature, and it is scarcely less of a feat to create new simplicity out of the complexity of the literature."

The question might well be asked whether our national investment in information analysis is not unwisely low in comparison with our investment in new educational research. As part of a larger federal agency that sponsors such research, the ERIC system is one major attempt to correct the imbalance. The Clearinghouse on Educational Management operates with an acute sense of its own responsibility to produce information analysis products that will contribute to the progress of both research and practice. □

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